

to the work, *Atlas des gestirnten Himmels für Freunde der Astronomie*, has also been revised by Dr. K. von Littrow.

It was principally through the representations of Professor von Littrow, that the Imperial Academy of Sciences at Vienna proposed in 1869 a scheme for awarding a series of prizes, limited to eight annually, for the discovery of telescopic comets during the three years' interval between May 31, 1869, and May 31, 1872. The prizes to be awarded consisted either of a sum of money—twenty Austrian ducats—or of a gold medal of equivalent value. The scheme was faithfully carried out, and before Professor von Littrow's death it was proposed to the Academy to continue the prizes for another term.

The situation of the Vienna Observatory, in the midst of narrow streets, has long been felt as a serious hindrance to the prosecution of any delicate astronomical work. The present building was erected in 1826–27, under the direction of Professor J. J. von Littrow, on the site of the old Observatory, founded in the year 1753, Father Hell being the first director. The requirements of astronomy of the present day in a national Observatory induced Professor von Littrow to represent to the Austrian Government the desirability of removing the Observatory to a more favourable position out of the city. This recommendation was acceded to, and in 1873 the sanction of the Minister of Public Instruction was obtained for the erection of a building capable of containing instruments of the largest construction, and fitted with every astronomical appliance required in the pursuit of meridional, equatoreal, or physical observations. The foundation stone of the new Observatory was laid in June 1874, about three miles to the north of the centre of Vienna, and at the present time is approaching completion. Professor von Littrow was not permitted to see the full effects of his design, but the works were sufficiently advanced before his death to enable him to foresee the material advantage which astronomy has gained by the increased accommodation in the new Observatory, and the absence of the noise and dirt which so injuriously affect the observations in the present building. Among the instruments which it is proposed to erect, the great refractor of 26 inches aperture is the most noted. This instrument is in progress of construction by Mr. Howard Grubb, of Dublin.

Professor von Littrow was elected an Associate of our Society in April 1853. He was also a corresponding member of several other scientific societies. His death took place on the morning of November 16, 1877, at Venice, where he had gone for the benefit of his health. He was in the sixty-seventh year of his age.

E. D.

GIOVANNI SANTINI was born on the 30th of January 1786 or 1787 (both dates have been mentioned), at Caprese, near Borgo di San Sepolcro, in the province of Arezzo, Tuscany. In early

life he studied astronomy with Piazzini at Pisa, and afterwards he placed himself under the direction of Oriani, director of the Observatory in the Jesuit College at Milan, and of his assistant, Cesaris. In November 1806 he was appointed an assistant astronomer in the Observatory at Padua, where in a few years he became known as one of the rising young astronomers of the age. So early as 1808 and 1809 we find that Santini was a contributor to the *Monatliche Correspondenz* of Zach, and his papers in that publication, containing observations of a recently discovered comet, and of the minor planets *Ceres* and *Vesta*, gave indications of his future successful career as a practical astronomer.

In 1813 Santini received the appointment of Professor of Astronomy in the University of Padua, and also of Director of the Observatory. While strictly devoting himself to the duties of his professorship, he never neglected those of the Observatory, and he lost no opportunity of observing any newly discovered comet, and the first four minor planets, especially of *Vesta*, which he continued to observe regularly at every opposition for more than twenty years after its discovery. During a large portion of his long career, miscellaneous observations of this kind continued to be his favourite occupation, and an examination of the titles of his papers shows that the greater number of his communications to Societies, the *Astronomische Nachrichten*, and other serial publications relate chiefly to this branch of equatorial astronomy.

In 1837 Professor Santini resolved to inaugurate a new system of observations at the Observatory of Padua. In that year an excellent meridian-circle was erected, and with this instrument he was induced to undertake some special meridional work in addition to that which had hitherto occupied his time; but in doing this he determined still to continue occasionally his equatorial observations. In his ordinary measurements of differences of right ascension and declination between comets or minor planets and neighbouring stars, Santini often experienced much inconvenience from the difficulty of finding in existing star-catalogues a sufficient number of stars suitable for comparison whose places had been satisfactorily determined. At that time the reduced places of the zone-stars observed by Bessel were not available, nor was there any other catalogue of small stars which could give much assistance to the observer. He therefore considered that his new instrument could not be employed in more useful work than in supplying well-determined places of a selected number of small stars suitable for the required purpose. He therefore planned a scheme of zone-observations of stars in right ascension and declination with the new meridian-circle, so that in each parallel of declination, within certain limits north and south of the Equator, there should be found a star, at every eight or ten minutes of time, whose place could be depended upon. Santini commenced his observations early in 1838, and all the observations made from that date to

the autumn of 1840 were reduced and incorporated into a Catalogue of 1677 stars. He communicated this catalogue, the first of a series, to the Royal Astronomical Society in December 1840, under the title of a *Catalogue of 1677 Stars included between the Equator and 10° of North Declination, observed at the Royal Observatory of Padua*. It is inserted in vol. xii. of the *Memoirs*. The places derived from this catalogue were at once recognised as being well determined, and they have been found of great service in comparison-observations of the minor planets and comets. This practical confirmation of the desirability of an extended system of observation of the positions of small stars, at a time when there was no reduced catalogue of these objects in existence, had some influence in encouraging Santini to continue his observations of the remaining zones which formed part of his original scheme. These zone-observations were therefore continued at Padua under Santini's direction, either by himself or by his assistants, Trettenero, who died in 1863, and Lorenzoni. Several instalments have appeared from time to time, each containing the reduced places of a large number of stars, and the complete series of catalogues forms a very valuable contribution to the libraries of astronomers. Excepting the first catalogue, they were communicated to the Istituto Veneto di Scienze, and published in the *Memoirs* of that Society. Our own *Memoirs* and *Monthly Notices* contain many records of Santini's labours, chiefly observations of comets in various years, and of the planets *Ceres*, *Pallas*, and *Vesta* in 1826; observations of the right ascension of *Venus* about her inferior conjunction in 1830, and miscellaneous notes. In an important paper on the solar eclipse of July 1851, Professor Santini has discussed the different observations made in various parts of Europe, from which he has deduced corrections to the lunar tables of Burckhardt in longitude and latitude, and to the sum of the semidiameters of the Sun and Moon. By substituting the resulting values of the three corrections in the equations of condition, he found that they satisfactorily represent the residual errors. His papers on the variations in the elliptic elements of the periodical comet of Biela, produced by the action of *Jupiter*, *Saturn*, and the Earth, deserve also a special mention.

Few astronomers have had the opportunity of devoting so many years to the service of astronomy as Santini. The best proof of the activity of his life as an observer is contained in the *Catalogue of Scientific Papers* prepared by the Royal Society. Though the first section of this work only includes papers published before the end of 1863, we find in it the titles of 137 separate astronomical papers duly recorded. He was also the author of an excellent treatise on *The Elements of Astronomy*, and of another on *The Theory of Optical Instruments*.

At one period of his life the health of Professor Santini gave great anxiety to his friends, which he himself evidently shared. In 1840, having scarcely completed his first series of zone-

observations, he, at the age of fifty-four, wrote of the rapidly declining state of his health, and he expressed doubts whether, at his age, with weak health, he would be able to accomplish the work which he had laid down for himself to do. He knew, however, that his scheme of zone-work, if successfully carried out, must prove useful to astronomers, and that, if his illness continued, others would probably undertake to complete the observations of the remaining zones. His illness and its accompanying anxieties fortunately passed away, and with the valuable assistance in the Observatory of Signors Trettenero and Lorenzoni, he lived to see the general completion of his original plan of observations and the publication of the reduced mean places of the stars for the respective epochs of the catalogues.

In early life Santini entered the Church, in which he had priest's orders. This, however, never interfered with his professional work as the Professor of Astronomy in the University, or as the Director of the Observatory. In private life he was universally beloved and respected, and though he survived to the great age of ninety-one, his death caused a blank among his scientific friends which will be difficult to fill. He died on the morning of the 26th of June 1877, at his residence at Padua.

Santini was elected an Associate of our Society so long ago as March 1825.

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